STEM

SCIENCE | TECHNOLOGY | ENGINEERING | MATH

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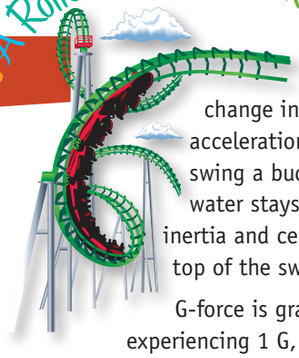
Growing future scientists, technologists, engineers, and mathematicians with the newspaper!

Roller Coaster Physics

How Does A Roller Coaster Work?



If you are curious about how it feels to be an astronaut, look no farther than your favorite amusement park. You can learn about potential energy, kinetic energy, acceleration, centripetal force, gravity, inertia, G-force, and much more.

When you are riding a roller coaster, the first hill will be the tallest. This allows the roller coaster to gather potential energy. As the roller coaster soars down the hill, the potential energy is changed to kinetic energy, the energy of motion. Acceleration is the process of speeding up, slowing down, or changing direction.

When you go around a roller coaster loop, you feel pushed against your seat. This is because an object in motion will stay in motion unless acted upon by an unbalanced force — Newton's 1st Law. On a roller coaster loop, you are changing direction, and the push you feel from the seat is really your body continuing to travel in the direction it was, and running into the seat that is turning. The acceleration due to a turn or change in direction is caused by a centripetal acceleration. A similar thing happens when you swing a bucket of water around in a circle. The water stays contained in the bucket because of inertia and centripetal force. The moment before the top of the swing, the water was headed up!"

G-force is gravitational pull. Right now, you are experiencing 1 G, the natural gravitational pull of the earth. Riding a roller coaster will cause your body to experience 3 to 6 Gs, which is 3 to 6 times the usual gravitational pull. When Gs increase, your heart beats faster. The excitement and adrenaline you feel on the roller coaster is connected to the sudden change in G-forces.

For more information: If you would like to learn more about roller coaster science, visit: http://www.learner.org/interactives/parkphysics/index2.html

Learning Standards: I can read a nonfiction article for background information. CCS.ELA-LiteracyCCRA.R.2, CCS.ELA-Literacy.CCRA.L.6

Become A Mad Scientist!

In this experiment from Exploratorium, you will be creating a spinning blimp. This experiment will allow you to observe how simple changes to design can alter flight patterns. Scientists learn through trial and error to see what is effective and what isn't. Even a "mistake" is learning—it teaches you what does not work.

Materials Needed: Paper • Ruler • Scissors • Journal to Record Results and Observations

Process:

1. Cut a strip of paper 6 inches long and ½ inch wide.
2. Cut halfway across the strip about ½ inch from one end. Turn the strip around and do the same thing on the other end.
3. Slip the slot at one end into the slot at the other end to create a circular blimp.
4. Hold the blimp high over your head and drop it to the ground. Watch carefully and see how it spins.
5. Observation time. Experiment with the designs and use your journal to record how these changes affect the spinning pattern of your blimp. Try making the strip longer or shorter, narrower or wider, or make the tails longer or shorter, or cut the ends of the tails into different shapes. Use different kinds of paper (construction paper, cardstock, etc.)
6. Optional: You can use crayons or markers to color your blimp. Although this won't affect flight pattern, you can observe the designs as your blimp spins.

Reflection: With your class, discuss what worked well and what didn't.

Learning Standards: I can follow directions to complete an experiment. I can make observations on how simple changes affect flight design and patterns. CCSS.ELA-Literacy.CCRA.R.1

Extra! Read All About It!

Use the newspaper to complete these activities to sharpen your skills.

Activity 1: Circle words in the newspaper that begin with capital letters. Discuss why each word begins with a capital letter. Then, identify the words that are proper nouns. Write them in a chart labeled person, place, and thing.

Activity 2: Find an interesting news story to evaluate. Read the story. Identify and number the main ideas in order of importance. Explain why you chose that order.

Learning Standards: I can use the newspaper to locate proper nouns. I can identify main idea. I can write for a specific purpose (to inform) and for a specific audience. CS.ELA-LiteracyCCRA.R.2, CCS.ELA-Literacy.CCRA.L.6

Go Figure!

The following three formulas will help you answer questions about speed.

Time = Distance ÷ Speed
Speed = Distance ÷ Time
Distance = Speed x Time

1. How long will it take a bicycle rider to travel 32 miles at a constant speed of 8 miles per hour? _____
2. If a car travels 170 miles at a constant speed in 5 hours, at what speed was it traveling? _____
3. If a bus travels for 3 hours at 55 miles per hour, how far does it travel? _____
4. A train covers a distance of 520 miles in 8 hours. At a constant speed, how fast is it traveling? _____

Learning Standards: I can add, subtract, multiply, and divide to solve a problem. CCSS.MathContent.3.OA.A3

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